PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL INSTITUTION OF GREAT BRITAIN.

May 13, 1853.—The Duke of Northumberland, K.G., F.R.S., President, in the Chair.

On some New Points in British Geology. By Prof. EDWARD FORBES, F.R.S., President of the Geological Society.

Not many years ago it used to be said, that the geology of England was done, and yet the best investigated localities are constantly affording fresh discoveries. When the Lecturer last year exhibited Captain Ibbetson's beautiful and accurate model of Whitecliff Bay in the Isle of Wight, in illustration of his views respecting the distribution of species in time, he had not the slightest suspicion that this particular locality, so often and apparently so thoroughly explored, could yield new results and new interpretations. Nevertheless, having had occasion, at the suggestion of Sir Henry De la Beche, to examine the tertiary strata of the Isle of Wight for the purposes of the Geological Survey of Great Britain, this very bay of Whitecliff proved to be a rich source of novel geological information. Moreover, a great portion of the Isle of Wight, on further examination, turned out to belong to a division of the older tertiaries, that had never been demonstrated to exist within the British Islands. As a general statement of these results and of their bearings may be more intelligible to non-professional lovers of geology than the detailed memoirs about to be published on the subject, Professor Forbes has taken this opportunity of communicating them to the Members of the Royal Institution.

The Isle of Wight is divided into two portions by a great chalk ridge running east and west. This is the ridge of vertical chalk beds. To the north of it, the country is composed of tertiary, to the south, of older strata, as far down in the geological scale as the Wealden. The Lower Greensand or Neocomian beds occupy the greater part of the surface of the southern division, and freshwater tertiaries that of the northern. At Alum Bay, on the west, and Whitecliff Bay, on the east, the ends of the older tertiary strata, as they rise above the chalk, are seen truncated and upturned, being all affected by the movement which caused the verticality of the chalk. These tertiaries constitute the following groups, successively enumerated in ascending order: the Plastic clay, the Bognor series (equivalents of the true London clay), the Bracklesham series, and the Barton series, upon which lie the Headon Hill sands, and those freshwater strata that spreading out form the gently undulating country, extending from near the base of the chalk ridge to the sea.

Owing to the sections at Headon Hill near Alum Bay being so clear and conspicuous, and their position being in the loftiest tertiary hill that exhibits its internal structure in the island, the freshwater and fluvio-marine beds which compose that elevation have long attracted attention and have been described by many observers,

the first of whom was the late Professor Webster. The apparent slight inclination of these beds, as seen in the Headon section, except at the point where they are suddenly curved in conformity with the verticality of the chalk and the beds immediately above it, appear to have led geologists to the notion that the fluvio-marine portion of the Isle of Wight was composed entirely of continuations of the beds forming Headon Hill. Two observers only suspected a discrepancy, viz. Mr. Prestwich, who, in a short communication to the British Association at Southampton, expressed his belief that Hempstead Hill, near Yarmouth, would prove to be composed of strata higher than those of Headon; and the Marchioness of Hastings, who, having given much time to the search for the remains of fossil vertebrata in the tertiaries of the Isle of Wight and Hordwell, declared her conviction that these remains belonged to distinct species, according as they were collected at Hordwell, Hempstead, and Ryde, and that these three localities could not, as was usually understood, belong to the same set of strata. The recently published monograph of the pulmoniferous mollusks of the English Eocene Tertiaries, by Mr. Frederic Edwards, afforded also indications of the shells therein so well described and figured having been collected in strata of more than one age.

A few days' labour at the west end of the island convinced Professor Forbes that the surmises alluded to were likely to prove true, and that the structure of the north end of the island had been in the main misunderstood. After four months' constant work at both extremities and along the intermediate country, he succeeded in making out the true succession of beds, with most novel and gratifying results. During this work he was greatly aided by his colleague, Mr. Bristow, and by Mr. Gibbs, an indefatigable and able collector attached to the Geological Survey.

The freshwater strata of Whitecliff Bay proved to be wholly misinterpreted. Instead of their being constituted out of the Headon Hill strata only, more than a hundred feet thickness of them are additional beds characterized by peculiar fossils, and resting upon a marine stratum that overlies the Bembridge limestone, the equivalent of which at Headon is a soft concretionary calcareous marl, scarcely visible except in holes among the grass immediately under the gravel on the summit of the hill.

The beds of the true Headon series, in fact, are all included in the subvertical portion of the Whitecliff sections and are there present in their full thickness. They are succeeded by peculiar strata of intermediate character, for which the name of St. Helen's beds is proposed, and which become so important near Ryde that they constitute a valuable building stone. The Bembridge limestone that lies above is the same with the Binstead limestone near Ryde, out of which were procured the remains of quadrupeds of the genera *Anoplotherium*, *Palæotherium*, &c., identical with those found in the gypsiferous beds of Montmartre. The Sconce limestone near Yarmouth is also the same, and none of these limestones are identical with any of those conspicuous among the fluvio-marine strata at

Headon Hill, and with which they have hitherto been confounded. They are far above them, and are distinguished by distinct and peculiar fossils.

Almost all the country north of the chalk ridge, exclusive of the small strip occupied by the marine Eocenes, is composed of marls higher in the series than any of the Headon Hill beds, and hitherto wholly undistinguished, except in the Whitecliff section, where the age and relative position had been entirely mistaken. These are the Bembridge marls of Professor Forbes. Above them are still higher beds preserved only in two localities, viz. at Hempstead Hill, to the west of Yarmouth, and in the high ground at Parkhurst. For these the name of Hempstead series is proposed. Their characteristic fossils are very distinct, and the highest bed of the series is marine. These beds prove to be identical with the Limburg or Tongrien beds of Belgium and with the Grès de Fontainebleau series in France. We thus get a definite horizon for comparison with the Continent, and are enabled to show, that instead of our English series of Eocene tertiaries being incomplete in its upper stages as compared with those of France and Belgium, it is really the most complete section in Europe, probably in the world. We are enabled by it to correct the nomenclature used on the Continent, and to prove that the so-called Lower Miocene formations of France and Germany are in true sequence with the Eocene strata, and are linked with them both stratigraphically and by their organic contents. We are also enabled to refer, with great probability, the so-called Miocene tertiaries of the Mediterranean basin, of Spain and Portugal,—those of the well-known Maltese type—to their true position in the series, and to place them on a horizon with the Tongrien division of the Eocenes. As these Maltese beds are unconformable, and evidently long subsequent to the deposition of the great nummulitic formation, we are enabled to assign an approximate limit to the estimate of the latest age of that important series. From well-marked analogies we get at a probable date even for the Australian tertiaries. Thus the deciphering of the true structure of a small portion of the British Islands can throw fresh light upon the conformation of vast and far-apart regions.

The peculiar undulatory contour of the surface of the fluvio-marine portion of the Isle of Wight is due to the gentle rolling of these beds in two directions, one parallel with the strata of the chalk ridge, and the other at right angles to it. The valleys and hills running northwards to the sea depend upon the synclinal and anticlinal curves of the latter system of rolls, a fact hitherto unnoticed, and the non-recognition of which has probably been one cause of the erroneous interpretation of the structure of the Isle of Wight, hitherto received. The truncations of these curves along the coast of the Solent exhibit at intervals beautiful and much neglected sections, well worthy of careful study. There is one of these sections near Osborne. Her Majesty's residence stands upon a geological formation hitherto unrecognized in Britain. Near West Cowes there are several fine sections along the shore. The total

thickness of unclassified strata in the Isle of Wight is 400 feet, if not more, and within this range are at least two distinct sets of organic remains. The fluvio-marine beds in all, including the Headon series, are very nearly 600 feet thick.

ZOOLOGICAL SOCIETY.

May 27, 1851.—W. Yarrell, Esq., V.P.L.S., in the Chair.

Description of new Land Shells from the Collection of H. Cuming, Esq. By Dr. L. Pfeiffer.

1. Helix audebardi, Pfr. *H. testâ imperforatâ, conoideo-globosâ, solidulâ, nitidâ, castaneo-fulvâ, strigis saturatioribus confertis ornatâ; spirâ conoideâ, apice obtusiusculâ, albidâ; anfractibus 5½ convexis, summis granulatis, ultimis irregulariter rugoso-striatis, ultimo inflato, anticè deflexo; columellâ perdeclivi, subarcuatâ, latâ, planâ, albâ; aperturâ perobliquâ, truncato-ovali, intus cæruleâ, nitidâ; peristomate incrassato, subreflexo, albo.*
Diam. maj. 48, min. 39, alt. 35 mill.
Hab. St. Domingo (*Sallé*).

2. Helix albersiana, Pfr. *H. testâ umbilicatâ, subturbinato-depressâ, tenui, acutè et confertim costatâ, diaphanâ, rufo-corneâ; spirâ subturbinatâ, apice acutâ; anfractibus 4½ convexis, celeriter accrescentibus, ultimo anticè deflexo, basi juxta umbilicum angustè constricto; aperturâ perobliquâ, lunato-ovali; peristomate tenui, marginibus subconniventibus, dextro breviter expanso, columellari dilatato, reflexo, intus plicâ obliquâ, dentiformi munito.*
Diam. maj. 14½, min. 12, alt. 8½ mill.
Hab. St. Domingo (*Sallé*).

3. Helix pubescens, Pfr. *H. testâ angustissimè umbilicatâ, depressâ, tenui, pilis mollibus, brevibus, confertis pubescente, diaphanâ, lutescente; spirâ vix convexâ, obtusâ; anfractibus 5, convexiusculis, ultimo subrotundato, altiore quam lato, non descendente; aperturâ vix obliquâ, rotundato-lunari; peristomate simplice, recto, margine columellari supernè breviter reflexo.*
Diam. maj. 11, min. 10, alt. 6 mill.
Hab. St. Domingo (*Sallé*).

4. Helix leucorhaphe, Pfr. *H. testâ angustè umbilicatâ, depresso-turbinatâ, subtilissimè striatulâ, diaphanâ, luteo-corneâ, fasciâ angustâ, cretaceâ, ad suturam ornatâ; spirâ subturbinatâ, apice obtusiusculâ; anfractibus 6 planiusculis, ultimo convexiore, non descendente, basi subplanato; aperturâ vix obliquâ, lunari; peristomate simplice, recto, margine columellari reflexiusculo.*
Diam. maj. 10, min. 9, alt. 6 mill.
Hab. St. Domingo (*Sallé*).

5. Succinea dominicensis, Pfr. *S. testâ ovali, solidulâ, substriatâ, corneo-albidâ, punctis corneis irregulariter aspersâ; spirâ conicâ, acutâ; anfractibus 3½ convexis, summis corneis, ultimo*